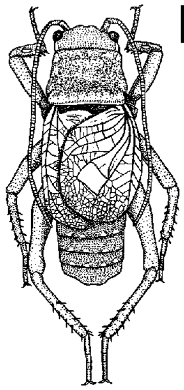


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CLASSIFICATION OF ORDER GRYLLOBLATTIDA (INSECTA), WITH DESCRIPTION OF NEW TAXA

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A review of the system of the order Grylloblattida is made. There are three suborders: Lemmatophorina (with 5 Carboniferous – Triassic families), Protoperlina (with 16 Carboniferous – Lower Cretaceous families) and Grylloblattina (with 23 Permian – Lower Cretaceous families and 1 recent one). Fore new families are established: Aliculidae **fam. n.**, Idelinellidae **fam. n.**, Pinideliidae **fam. n.** and Kortshakoliidae **fam. n.** *Alicula asiatica* **sp. n.** is described from Upper Permian of Kazakhstan. New synonymies are proposed: Euryptilonidae Martynov, 1940 = Stereopteridae Carpenter, 1950, **syn. n.**; *Geinitzia* Handlirsch, 1906 = *Hannoptera* Bode, 1953, **syn. n.**; *Geinitzia varia* Bode, 1953 = *Hannoptera promota* Bode, 1953, **syn. n.; ***Shurabia* Martynov, 1937 = *Nivoptera* Lin, 1978, **syn. n.** = *Meixiella* Huang, Li et Lin, 1991, **syn. n.** The genera *Blania* Kukalova, 1964, *Karaungirella* Storozhenko, 1991, *Maculopterum* Kukalova, 1964, *Oborella* Kukalova, 1964, *Quercopterum* Kukalova, 1964, *Sharovipterum* Kukalova, 1964, *Torrentopterum* Kukalova, 1964 and *Villopterum* Kukalova, 1964 are transferred from Lemmatophoridae to Euryptilonidae. New combinations are proposed: *Shurabia postiretis* (Huang, Li et Lin, 1991), **comb. n.**, *Shurabia nanshenghuensis* (Lin, 1978), **comb. n.** and *Shurabia fuyuanensis* (Lin, 1978), **comb. n.** Families Permembiidae (order Miomoptera) and Sheimiidae (order Embioptera) are removed to order Grylloblattida. Family Permotermopsidae is considered as

distinct family (not synonym of Ideliidae). All known genera of each grylloblattid family are listed. Lists of grylloblattids of uncertain position and taxa erroneously included in Grylloblattida are given.

KEY WORDS: Grylloblattida, classification, new families, new species, new synonymies, distribution.

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Дан обзор системы насекомых отряда Grylloblattida. Отряд разделен на 3 подотряда: Lemmatophorina (5 семейств, извесных с карбона до триаса), Protoperlina (16 семейств, извесных с карбона до нижнего мела) и Grylloblattina (23 семейства, извесных с перми до нижнего мела, и 1 современное семейство). Установлено 4 новых семейства: Aliculidae **fam.n.**, Idelinellidae **fam.n.**, Pinideliidae **fam.n.** и Kortshakoliidae **fam.n.** Из верхней перми Казахстана описан *Alicula asiatica* **sp.n.** Установлена новая синонимия: Euryptilonidae Martynov, 1940 = Stereopteridae Carpenter, 1950, **syn. n.**; *Geinitzia* Handlirsch, 1906 = *Hannoptera* Bode, 1953, **syn. n.**; *Geinitzia varia* Bode, 1953 = *Hannoptera promota* Bode, 1953, **syn. n.;** *Shurabia* Martynov, 1937 = *Nivoptera* Lin, 1978, **syn. n.** = *Meixiella* Huang, Li et Lin, 1991, **syn. n.** Роды *Blania* Kukalova, 1964, *Karaungirella* Storozhenko, 1991, *Maculopterum* Kukalova, 1964, *Oborella* Kukalova, 1964, *Quercopterum* Kukalova, 1964, *Sharovipterum* Kukalova, 1964, *Torrentopterum* Kukalova, 1964 и *Villopterum* Kukalova, 1964 перенесены из семейтва Lemmatophoridae в Euryptilonidae. Предложены новые комбинации: *Shurabia postiretis* (Huang, Li et Lin, 1991), **comb. n.**, *Shurabia nanshenghuensis* (Lin, 1978), **comb. n.** и *Shurabia fuyuanensis* (Lin, 1978), **comb. n.** Семейства Permembiidae (отряд Miomoptera) и Sheimiidae (отряд Embioptera) перенесены в отряд Grylloblattida. Восстановлено название семейства Permotermopsidae, ранее считавшееся синонимом Ideliidae. Для каждого семейства приведены все известные роды. Даны списки гриллоблаттидовых неясного таксономического положения и таксонов, ошибочно относившихся к гриллоблаттидовым.

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INTRODUCTION

First recent species of grylloblattids was described from Canada and placed in a new family Grylloblattidae of the order Orthoptera (Walker, 1914). Later recent grylloblattids are considered as "group" or suborder of the order Orthoptera, or distinct order clearly separated from Orthoptera, Dermaptera, Blattoptera and other orders of "Orthopteroid" insects. There were a few attempts to place the family Grylloblattidae in the fossil orders Protorthoptera (Zeuner, 1939), Paraplecoptera (Martynov, 1938), or in the order Notoptera as suborder Grylloblattodea (Kevan, 1977), but only after description of Jurassic *Blattogryllus karatavicus* Rasnitsyn, 1976 it was clear that

Grylloblattidae belongs to the mainly Paleozoic order Grylloblattida [Paraplecoptera (part.) + Protoperlaria + Protoblattodea (part.) + Grylloblattodea] (Rasnitsyn, 1976; Storozhenko, 1992; 1997).

The systematic of the fossil grylloblattids has experienced considerable changes during the last few decades. Firstly almost all fossil grylloblattids are placed in artificial order Protorthoptera (Handlirsch, 1906; 1925). A.G. Martynov (1925) divided this order into two suborders: Protorthoptera s. str. and Paraplecoptera. R.Tillyard (1928) erected order Protoperlaria for the family Lemmatophoridae. F.Carpenter agrees with separation of the Protoperlaria (Carpenter, 1935), but later he united Protoperlaria with Protorthoptera (Carpenter, 1943; 1950; 1965; 1992). A.G. Martynov (1938) placed orders Paraplecoptera and Protoperlaria in "orthopteroid" insects of the cohort Polyneoptera. He included in the order Protoperlaria six families: Lemmatophoridae, Atactophlebiidae, Germanopriscidae, Kazanellidae (now Liomopteridae), Geinitziidae and Khosaridae (now Liomopteridae). In Paraplecoptera Martynov distinguished seven groups as follow:

1. Spanioderidae	**3. Strephocladodea**	**5. Idelodea**	**6. Cacurgoidea**
Spanioderidae	Strephocladidae	Ideliidae	Cacurgidae
Palaeocixiidae	Mesorthopteridae	Liomopteridae	Narkemidae
Thoronysididae	Tshorkuphlebiidae	Permocapniidae	Coseliidae
Ischnoneuridae	Nugonioneuridae	Lepiidae	Omalidae
Gymenophlebiidae	**4. Apithanidae**	Camptoneuritidae	Pachytylopsidae
2. Geraridae	Apithanidae	Nemuropsidae	**7.Cnemidolestoidea**
Geraridae			Cnemidolestidae

A.G.Sharov (1961; 1962) proposed division of the order Paraplecoptera into six superfamilies with 56 families as follow:

1. Ideliidea	**4. Cacurgidea**	**5. Liomopteridea**
Ideliidae	Cacurgidae	Liomopteridae
Archiprobnisidae	Stygneididae	Palaeocixiidae
Camptoneuritidae	Paoliidae	Roomeriidae
Demopteridae	Homalophlebiidae	Reculidae
Chelopteridae	Narkemidae	Phenopteridae
2. Geraridea	Thoronysidae	Stereopteridae
Geraridae	Pachytylopsidae	Probnisidae
Spanioderidae	Protokollariidae	Protembiidae
Cnemidolestidae	Prototettigidae	Germanopriscidae
Hapalopteridae	Coseliidae	Chaulioditidae
Cymenophlebiidae	Omaliidae	Stegopteridae
Ischnoneuridae	Stenaroseridae	Euremiscidae
Hadentomidae	Mixotermitidae,	Sylvaphlebiidae
Emphylopteridae	Laspeyresiellidae	Lemmatophoridae
Kliveriidae	Adeloneuridae	Atactophlebiidae
Tillyardembiidae	Klesiellidae	Tomiidae
3. Strephocladidea	Homoeodictyidae	Geinitziidae
Strephocladidae	Triassomanteidae	**6. Megakhosaridea**
Strephoneuridae	Xenopterigidae	Megakhosaridae
Mesorthopteridae	Mesotitanidae	

The majority of these families was placed in the orders Protoptera, Caloneurodea and Hypoperlida (Rasnitsyn, 1980b), and only 28 following families were belonged to Grylloblattida (Rasnitsyn, 1980a):

Narkemidae	Protembiidae	Probnisidae	Permoneuridae
Protoperlidae	Phenopteridae	Stereopteridae	Megakhosaridae
Lemmatophoridae	Sylvaphlebiidae	Euryptilonidae	Tomiidae
Liomopteridae	Euremiscidae	Tillyardembiidae	Mesorthopteridae
Demopteridae	Halvatidae	Ideliidae	Geinitziidae
Camptoneuritidae	Jabloniidae	Atactophlebiidae	Blattogryllidae
Chelopteridae	Skaliciidae	Archiprobnisidae	Grylloblattidae.

Recently I included in Grylloblattida 37 families, divided order into three suborders (Lemmatophorina, Protoperlina and Grylloblattina), and proposed draft phylogenetic scheme of order (Storozhenko, 1997). Based on the main synapomorphies of the order Grylloblattida, i.e. a concaved and distinctly desclerotized near the middle *MP* of fore wing, simple concaved *CuP* of fore wing, an arch-like or angle-like flexure of *CuA* near the base of hind wing, fore wings folding over abdomen at rest, and the hind wing anal area enlarged and bending down at rest along fold before A_2, forty five families are considered to belong to Grylloblattida here. In this paper the review of all families of order Grylloblattida and description of new taxa are given.

CLASSIFICATION

Order Grylloblattida Walker, 1914

I. Suborder Lemmatophorina Storozhenko, 1997

DIAGNOSIS. Large or rare medium size. Body robust (Fig. 1). In fore wing the branches of *CuA* not placed along hind margin of wing (exept *Dalduba*), never regularly pectinated (Fig. 2). Area between *CuA* and *CuP* in hind wing not broadened: the width of this area equal to width of area between *CuP* and A_1 (Fig. 3). The base of *CuA* of hind wing with arch-like flexure. A_2 in hind wing irregularly pectinated. Tergites with lateral lobes. Cerci long, multisegmented. Subimago (winged nymph of last instars) present, or increasing of tarsal segments during individual development is mentioned. Permian forms has nymphal adaptation to a semiaquatic habit.

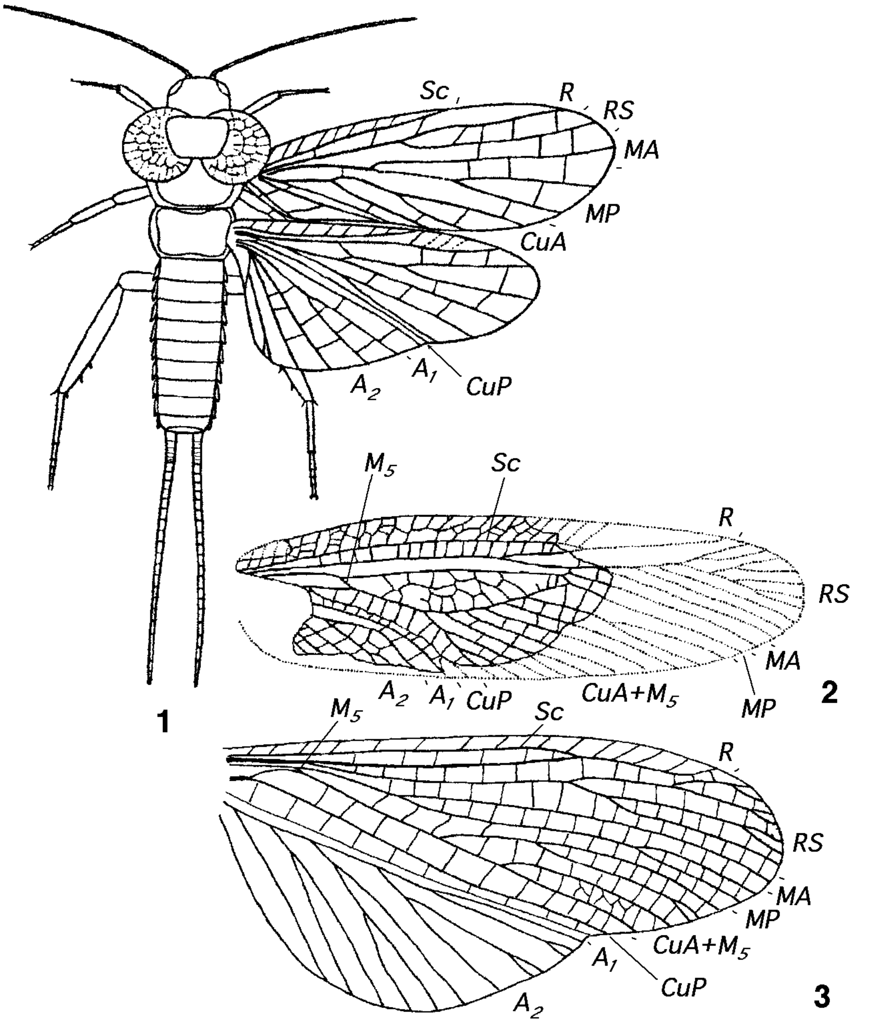
FAMILY INCLUDED. Five families from Carboniferous and Permian.

1. Family Daldubidae Storozhenko, 1996

GENERA INCLUDED. Two genera (*Dalduba* Storozhenko, 1996 and *Vrezalduba* Storozhenko, 1996) from Upper Carboniferous of Siberia.

2. Family Narkeminidae Storozhenko, 1996

GENERA INCLUDED. Three genera (*Narkemina* Martynov, 1931, *Paranarkemina* Pinto et Ornellas, 1980 and *Narkeminopsis* Whalley, 1979) from Upper Carboniferous of Great Britain, Siberia, Brasil, Argentina and Madagascar.



Figs. 1-3. Suborder Lemmatophorina (after Carpenter, Sharov and original): 1) reconstruction of *Lemmatophora typa* Sellards, 1909 (Lemmatophoridae); 2, 3) *Narkemina angustata* Martynov, 1930 (Narkeminidae): 2) fore wing, 3) hind wing.

3. Family Atactophlebiidae Martynov, 1930

GENERA INCLUDED. Three genera (*Atactophlebia* Martynov, 1928, *Gurianovella* G.Zalessky, 1939 and *Olgaephilus* Storozhenko, 1990) from Permian of Europe and one genus (*Triasseuryptilon* Storozhenko, 1997) from Triassic of South America (Argentina).

4. Family Lemmatophoridae Sellards, 1909

SUBFAMILIES INCLUDED. Two subfamilies from Permian of North America and Europe.

4a. Subfamily Lemmatophorinae Sellards, 1909

GENERA INCLUDED. Three genera (*Lemmatophora* Sellards, 1909, *Lisca* Sellards, 1909 and *Artinska* Sellards, 1909) from Lower Permian of U.S.A.

4b. Subfamily Parapriscinae Carpenter, 1935

GENERA INCLUDED. Two genera (*Paraprisca* Handlirsh, 1919 and *Lecorium* Sellards, 1909) from Lower Permian of U.S.A. and Russia.

5. Family Euryptilonidae Martynov, 1940

Euryptilonidae Martynov, 1940: 15.
Stereopteridae Carpenter, 1950: 201. **Syn. n.**
Lemmatophoridae (partim): Kukalova, 1964: 92, 105; Storozhenko, 1991: 113.

REMARKS. The body structure and wing venation of genera *Stereopterum*, *Euryptilon* and *Euryptilodes* are quite similar, wherefore new synonymy is established. Moreover, Euryptilonidae distinguished from Lemmatophoridae in the coriaceous fore wing, well sclerotized *MP* of fore wing, and a full ring of paranota on pronotum (in Lemmatophoridae fore wing membranous, *MP* of fore wing desclerotized near middle, and pronotum with two lateral lobe-like paranota). Therefore genera *Blania*, *Karaungirella*, *Maculopterum*, *Oborella*, *Quercopterum*, *Sharovipterum*, *Torrentopterum* and *Villopterum* are transferred here from Liomopteridae to Euryptilonidae.

GENERA INCLUDED. 11 genera (*Blania* Kukalova, 1964, *Euryptilon* Martynov, 1940, *Euryptilodes* Sharov, 1961, *Karaungirella* Storozhenko, 1991, *Maculopterum* Kukalova, 1964, *Oborella* Kukalova, 1964, *Quercopterum* Kukalova, 1964, *Sharovipterum* Kukalova, 1964, *Stereopterum* Carpenter, 1950, *Torrentopterum* Kukalova, 1964 and *Villopterum* Kukalova, 1964) from Permian of North America, Europe and Asia.

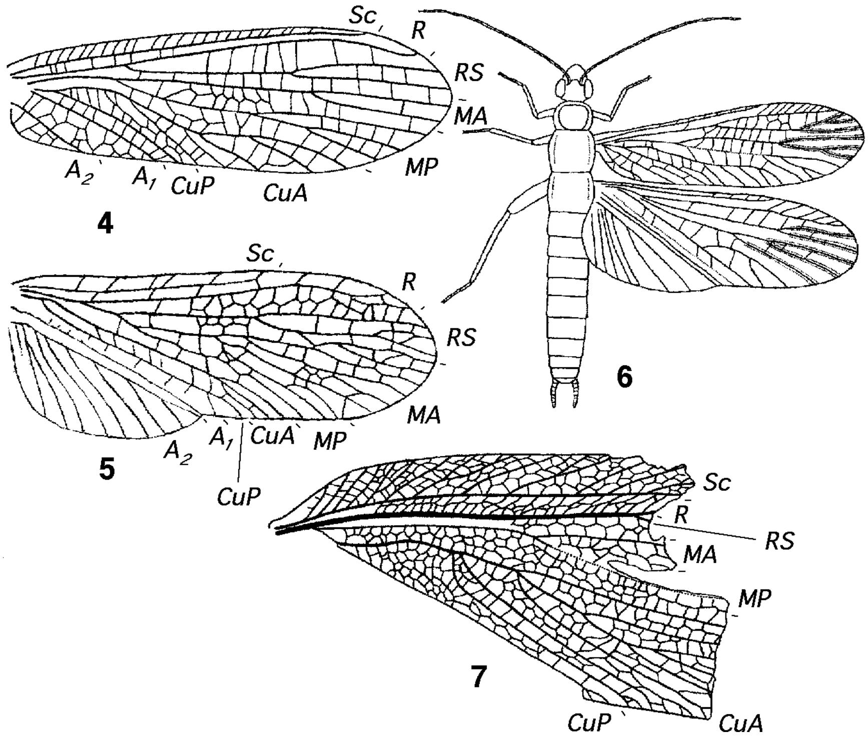
II. Suborder Protoperlina Storozhenko, 1997

DIAGNOSIS. Small or rare medium size. Body elongate, narrow (Fig. 6). In fore wing the branches of *CuA* placed along hind margin of wing, usually regularly pectinated (Fig. 4). Area between *CuA* and *CuP* in hind wing weakly broadened: the width of this area clear broader when width of area between *CuP* and A_1 (Fig. 5). The base of *CuA* of hind wing with arch-like flexure. A_2 in hind wing irregularly pectinated. Tergites without lateral lobes. Cerci as a rule short, with a few segments. Subimago unknown. Increasing of tarsal segments during individual development is not mentioned. Terrestrial forms adapted to concealment within narrow microcavities and galleries.

FAMILY INCLUDED. 16 fimilies from Carboniferous, Permian, Triassic and Lower Cretaceous.

6. Family Protoperlidae Brongniart, 1885

GENERA INCLUDED. Fore genera (*Protoperla* Brongniart, 1885, *Palaeocixius* Brongniart, 1885, *Protoblattina* Meunier, 1909, *Fabrecia* Meunier, 1911) from Upper Carboniferous of Europe.



Figs. 4-7. Suborder Protoperlina (after Carpenter and original): 4) fore wing of *Palaeocixius antiquus* Brongniart, 1885 (Protoperlidae); 5) hind wing of *Protoperla westwoodi* Brongniart, 1885 (Protoperlidae); 6) reconstruction of *Protembia permiana* Tillyard, 1937 (Protembiidae); 6) fore wing of *Alicula asiatica* sp. n. (Aliculidae).

7. Family Jabloniidae Kukalova, 1964

GENERA INCLUDED. One genus (*Jablonia* Kukalova, 1964) from Lower Perian of Europe.

8. Family Mesojabloniidae Storozhenko, 1992

GENERA INCLUDED. One genus (*Mesojablonia* Storozhenko, 1992) from Triassic of Central Asia.

9. Family Chelopteridae Carpenter, 1950

GENERA INCLUDED. One genus (*Chelopterum* Carpenter, 1950) from Lower Permian of U.S.A.

10. Family Protembiidae Tillyard, 1937

GENERA INCLUDED. One genus (*Protembia* Tillyard, 1937) from Lower Permian of U.S.A.

11. Family Tillyardembiidae G.Zalessky, 1938

GENERA INCLUDED. Two genera (*Tillyardembia* G.Zalessky, 1937 and *Tshekardembia* Novokshonov, 1995) from Lower Permian of Russia.

12. Family Probnidae Sellards, 1909

REMARKS. The name of this family is based on genus *Probnis*, therefore incorrect Probnisidae must be changed on Probnidae (Carpenter, 1992).

GENERA INCLUDED. One genus (*Probnis* Sellards, 1909) from Lower Permian of U.S.A.

13. Family Phenopteridae Carpenter, 1950

GENERA INCLUDED. Fore genera (*Brnia* Kukalova, 1964, *Chlumia* Kukalova, 1964, *Paraphenopterum* Storozhenko, 1992 and *Phenopterum* Carpenter, 1950) from Permian of North America and Europe.

14. Family Aliculidae Storozhenko, fam. n.

DIAGNOSIS. Fore wing medium size, slightly coriaceous, without hairs, stripes and spots, with broadly rounded apex. The subcosta (*Sc*) terminating on the costa (*C*) in apical third or quater of wing. Coslal area broad, with strong emargination near the base, sending off a series of branched veinlets. The radius (*R*) simple; its sector (*RS*) arising in proximal 1/3 of wing, with 3-6 branches, directed towards apex and posterior margin of wing. The media (*M*) divided in a well sclerotized main anterior branch (*MA*) and desclerotized near the middle, concaved main posterior branch (*MP*). The anterior cubitus (*CuA*) forked, but not divided into distinct CuA_1 and CuA_2. The posterior cubitus (*CuP*) unbranched, concaved. Area between *CuA* and *CuP* broad, with archedyction. Anal area narrow. Body and hind wing unknown.

REMARKS. Two genera of the family Liomopteridae are characterized by absents of CuA_1 and CuA_2 in fore wing (one of the most important character of Liomopteridae) and must be placed in a new separate family. Aliculidae closely related to Camptoneuritidae, but differs from latter as well as from all other families of the suborder Protoperlina in the shape of costal area.

GENERA INCLUDED. Two genera (*Alicula* Schlechtendal, 1913 [=*Permula* Handlirsch, 1919] and *Sojanopermula* Storozhenko, 1992) from Permian of Europe. One new species of the genus *Alicula* is described below.

***Alicula asiatica* Storozhenko, sp. n.**
(Fig. 7)

MATERIAL. Holotype - imprint and counter-imprint of fore wing, specimen N 2781/248; Kazakhstan: Karaungir-II (Vostochno-Kazakhstanskaya oblast, Zaisanskii Raion, Saur Mountains, right bank of Karaungir River about 600 m lower Maichat stream); Upper Permian: Maichat stage; in Paleontological Institute, Moscow.

DESCRIPTION. Length of imprint 12.2 mm, length of fore wing probably about 28 mm. Costal area 2.2 times broader than the subcostal area. *RS*

originating considerably distal to the main fork of *M*. Fore wing light, with dark veins. Body and hind wing unknown.

REMARKS. New species differs from *Alicula lebachensis* Schlechtendal, 1913 in more distal origin *RS* from *R*, and from *A*. *acra* (Kukalova, 1964) in 2-3 rows of cells in subcostal area.

15. Family Camptoneuritidae Martynov, 1931

GENERA INCLUDED. One genus (*Camptoneurites* Martynov, 1928) from Upper Permian of Russia.

16. Family Demopteridae Carpenter, 1950

GENERA INCLUDED. One genus (*Demopterum* Carpenter, 1950) from Lower Permian of U.S.A.

17. Family Permembiidae Tillyard, 1937

REMARKS. Family Permembiidae was described in the order Psocoptera (Tillyard, 1937). Later this family was placed in order Miomoptera (Martynova, 1962) or in the orthopteroid insects of uncertain position (Carpenter, 1976). Based on the body shape and wing venation Permembiidae is considered here as grylloblattids of the suborder Protoperlina.

GENERA INCLUDED. One genus (*Permembia* Tillyard, 1928) from Lower Permian of U.S.A.

18. Family Sheimiidae O.Martynova, 1958

REMARKS. This family originally was placed in the order Embioptera (Martynova, 1958), but based on shape of body and branches of *CuA* situated along posterior margin of fore wing is considered here as a member of suborder Protoperlina.

GENERA INCLUDED. One genus (*Sheimia* O.Martynova, 1958) from Upper Permian of Russia.

19. Family Sojanoraphidiidae O.Martynova, 1952

REMARKS. Family Sojanoraphidiidae was described in the order Rhaphidioptera, but recently was removed to Grylloblattida (Storozhenko & Novokshonov, 1995).

GENERA INCLUDED. Two genera (*Sojanoraphidia* O.Martynova, 1952 and *Aibolitus* Novokshonov et Storozhenko, 1996) from Permian of Europe (Russia).

20. Family Perloblattidae Storozhenko, 1992

GENERA INCLUDED. One genus (*Perloblatta* Storozhenko, 1992) from Triassic of Central Asia.

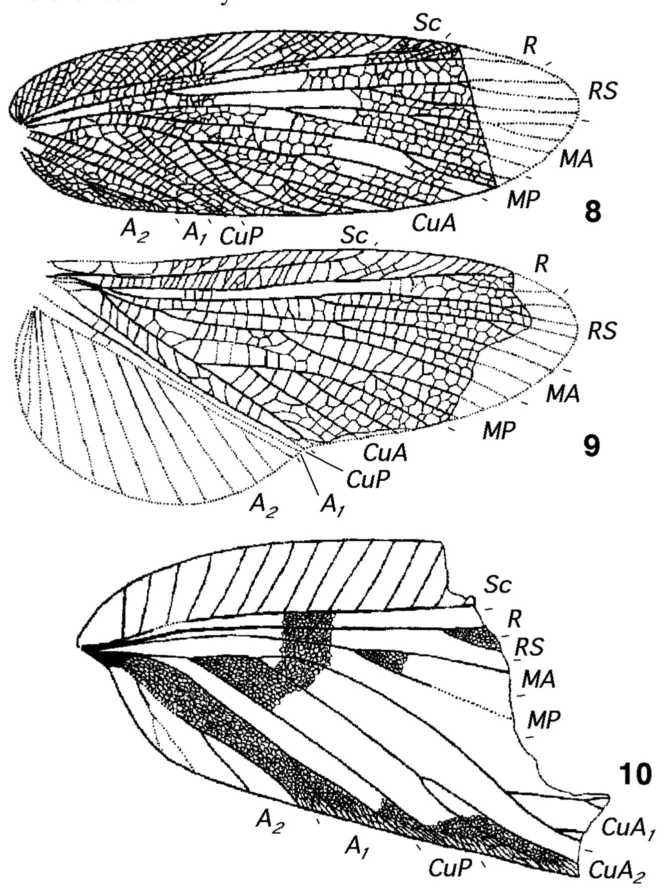
21. Family Oecanthoperlidae Storozhenko, 1988

GENERA INCLUDED. One genus (*Oecanthoperla* Storozhenko, 1988) from Lower Cretaceous of Siberia.

III. Suborder Grylloblattina Walker, 1914

DIAGNOSIS. Large, medium size or rare small. Body from robust to elongate. In fore wing the branches of *CuA* not placed along hind margin of wing, usually irregularly pectinated (Figs 8, 10-13). Area between *CuA* and *CuP* in hind wing strongly broadened: the width of this area considerably broader when width of area between *CuP* and A_1 (Fig. 9). The base of *CuA* of hind wing with angle-like flexure. A_2 in hind wing regularly pectinated. Tergites without lateral lobes. Cerci long, multisegmented. Subimago unknown. Increasing of tarsal segments during individual development is not mentioned. Terrestrial forms, both larvae and imago adapted to concealment within broad microcavities or to life on the plants.

FAMILY INCLUDED. 23 families from Permian, Triassic, Jurassic and Lower Cretaceous and one recent family.



Figs. 8-10. Suborder Grylloblattina (after Sharov and Storozhenko): 8, 9) *Archidelia elongata* Sharov, 1961 (Ideliidae): 8) fore wing, 9) hind wing; 10) fore wing of *Idelinella macroptera* Storozhenko, 1992 (Idelinellidae).

22. Family Archiprobnidae Sharov, 1961

REMARKS. The name of this family is based on genus *Archiprobnis*, therefore incorrect Archirobnisidae must be changed on Archiprobnidae (Carpenter, 1992).

GENERA INCLUDED. One genus (*Archiprobnis* Sharov, 1961) from Upper Permian of Siberia.

23. Family Ideliidae M.Zalessky, 1929

REMARKS. The main character of the family Ideliidae is the present of a few proximal branches of *CuA*, which terminating on *CuP* or disappearing in *CuA*-*CuP* area in fore wing (Fig. 8).

GENERA INCLUDED. 13 genera (*Aenigmidelia* Sharov, 1961, *Anaidelia* Storozhenko, 1997, *Archidelia* Sharov, 1961, *Ideliopsina* Storozhenko, 1997, *Kolvidelia* G.Zalessky, 1955, *Madygenidelia* Storozhenko, 1997, *Metidelia* Martynov, 1937, *Mongoloidelia* Storozhenko, 1992, *Pseudoshurabia* Storozhenko, 1997, *Rachimentomon* G.Zalessky, 1939, *Sojanidelia* Storozhenko, 1992, *Stenaropodites* Martynov, 1928 and *Sylvidelia* Martynov, 1940) from Permian and Triassic of Europe and Central Asia.

24. Family Idelinellidae Storozhenko, fam. n.

DIAGNOSIS. Fore wing large, membranous, without hairs, monochomous (Fig. 10). Costal area broad, sending off a series of simple veinlets. *RS* arising from *R* distal to main fork of *M*. The base of *M* fused shortly with *R*, than *M* divided in a well sclerotized *MA* and desclerotized near the middle, concaved *MP*. *CuA* with a long fork: CuA_1 with 4 branches, CuA_2 with 2 branches. *CuP* simple, straight, concaved. Area between *CuA* and *CuP* narrow, without veinlets, with archedyction. Anal area narrow. A_1 with 2, A_2 with 4 branches. Very dense archedictyon present in all areas except costal area. Body and hind wing unknown.

REMARKS. Genus *Idelinella* has been described in family Ideliidae, but differs from all other genera of Ideliidae by forked CuA_2 and by very narrow cubital area without any veinlets between CuA_2 and *CuP*. What is why this genus must be placed in new separate family.

GENERA INCLUDED. One genus (*Idelinella* Storozhenko, 1992) from Upper Permian of Russia.

25. Family Pinideliidae Storozhenko, fam. n.

DIAGNOSIS. Fore wing medium size, membranous, without hairs, stripes and spots, with broadly rounded apex (Fig. 11). *Sc* terminating on *C* in apical third of wing. Coslal area narrow, sending off 11 straight simple veinlets in apical half only. *R* simple; its sector (*RS*) arising in proximal 1/3 of wing, with branches directed towards apex of wing. The base of *M* not anastamozed with *R*; near first fork of *CuA* the main branch of *M* anastamozed with CuA_1, and after that divided into well sclerotized *MA* and desclerotized near the middle, concaved *MP* with 3 branches. *MA* anastamozed with *RS*. *CuA* distinctly divided into CuA_1 and CuA_2. CuA_1 with fork, CuA_2 with 3 branches. *CuP*

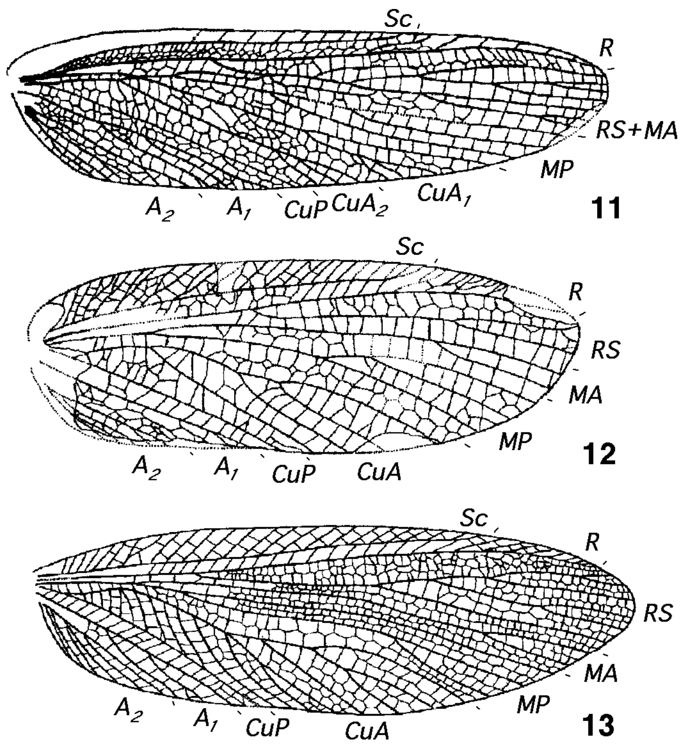
unbranched, concaved. Area between *CuA* and *CuP* with 2-3 rows of regular cells. Anal area long, narrow. A_1 with 3, A_2 with 4 branches. Veinlets in the almost all areas in distal half of wing simple, straight, in proximal part of wing areas with 2-3 rows of cells. Body and hind wing unknown.

REMARKS. Genus *Pinidelia* was described in Ideliidae, but easy distinguished from all known Ideliidae by present of CuA_1 and CuA_2, by anastamozes between *M*, *RS* and CuA_1, and by branched CuA_2. Here it is placed in new family.

GENERA INCLUDED. One genus (*Pinidelia* Storozhenko, 1994) from Upper Permian of Russia.

26. Family Kortshakoliidae Storozhenko, fam. n.

DIAGNOSIS. Fore wing medium size, membranous, without hairs, monochomous, with rounded apex (Fig. 12). *Sc* terminating on *C* in apical third of wing. Coslal area broad, sending off a series of branched veinlets. *R* simple; its sector (*RS*) arising in proximal third or near middle of wing, with branches



Figs. 11-13. Suborder Grylloblattina, fore wings (after Sharov and Storozhenko): 11) *Pinidelia sukatshevae* Storozhenko, 1994 (Pinideliidae); 12) *Paridelia pusilla* Sharov, 1961 (Kortshakoliidae); 13) *Permotermopsis pectinata* Martynov, 1937 (Permotermopsidae).

directed towards apex of wing. The base of *M* not anastamozed with *R*. *M* divided into well sclerotized *MA* and desclerotized near the middle, concaved *MP* with 3 branches. *MA* anastamozed with *RS* (*Kortshakolia* only). *CuA* with 4-6 branches directed to the hind margin of wing branches, not divided into CuA_1 and CuA_2. *CuP* unbranched, concaved. Area between *CuA* and *CuP* with 2 rows of irregular cells near the base, the apical part of area with mainly simple striate veinlets. Anal area short, narrow. A_1 simple, A_2 with 4 branches. Veinlets in the almost all areas of wing simple, striate, in radial area with 2 rows of cells. Body and hind wing unknown.

REMARKS. Genera *Kortshakolia* and *Paridelia* were described in family Ideliidae, but differs from all other genera of Ideliidae by absents of of branches of *CuA* directed to *CuP* and by presents of the simple veinlets in almost all areas. The differences are sufficiently marked to warrant the erection of a new family.

GENERA INCLUDED. Two genera (*Kortshakolia* Sharov, 1961 and *Paridelia* Sharov, 1961) from Permian of Russia (West Siberia).

27. Family Stegopteridae Sharov, 1961

GENERA INCLUDED. One genus (*Stegopterum* Sharov, 1961) from Lower Permian of Siberia.

28. Family Tologopteridae Storozhenko, 1992

GENERA INCLUDED. One genus (*Tologoptera* Storozhenko, 1992) from Upper Permian of Mongolia.

29. Family Bajanzhargalanidae Storozhenko 1992

GENERA INCLUDED. One genus (*Bajanzhargalana* Storozhenko, 1988) from Upper Jurassic of Mongolia.

30. Family Euremiscidae G.Zalessky, 1951

GENERA INCLUDED. One genus (*Euremisca* G.Zalessky, 1951) from Lower Permian of Russia.

31. Family Sylvaphlebiidae Martynov, 1940

GENERA INCLUDED. Four genera (*Sylvaphlebia* Martynov, 1940, *Sylvaella* Martynov, 1940, *Sylviodes* Martynov, 1940 and *Parasylviodes* Martynov, 1940) from Lower Permian of Russia.

32. Family Tomiidae Martynov, 1936

GENERA INCLUDED. One genus (*Tomia* Martynov, 1936) from Lower Triassic of Russia.

33. Family Tunguskapteridae Storozhenko et Vrsansky, 1995

GENERA INCLUDED. Two genera (*Tunguskaptera* Storozhenko et Vrsansky, 1995 and *Ferganamadygenia* Storozhenko et Vrsansky, 1995) from Upper Permian of Siberia and Triassic of Central Asia.

34. Family Geinitziidae Handlirsh, 1906

GENERA INCLUDED. Three genera (*Geinitzia* Hanlirsh, 1906, *Fletchizia* Riek, 1976 and *Shurabia* Martynov, 1937) from Triassic of South Africa, Australia, China and Central Asia and Jurassic of Europe and Asia.

Genus *Geinitzia* Handlirsh, 1906

Geinitzia Handlirsch, 1906: 427. Type species - *Gryllacris schlieffeni* Geinitz, 1884, by subsequent designation (Zeuner, 1939).

Hannoptera Bode, 1953: 38. Type species - *Hannoptera promota* Bode, 1953, by original designation. **Syn. n.**

REMARKS. *Hannoptera* is only hind wing of *Geinitzia*, wherefore new synonymy is established.

Geinitzia varia Bode, 1953

Geinitzia varia Bode, 1953: 33, tabl. 1, fig. 1. Holotype - fore wing, Germany: Braunshweig; Lower Jurassic; in Paleontologische Institut der Univ. Gottingen, Germany.

Hannoptera promota Bode, 1953: 38, tabl. 1, fig. 7. Holotype - hind wing, Germany: Braunshweig, Lower Jurassic; in Landesmuseum zu Hannover, Germany. **Syn. n.**

REMARKS. Four species of *Geinitzia* are known from Braunshweig: *G. fasciata* (Bode, 1904), *G. perlaesa* Bode, 1953, *G. supercauda* Bode, 1953 and *G. varia*. First three are relatively large (length of wing 20-30 mm), and only the wing of *G. varia* is the same size (16 mm) as *Hannoptera promota* (15.5 mm). Undoubtly *Hannoptera promota* is only hind wing of *Geinitzia varia*.

Genus *Shurabia* Martynov, 1937

Shurabia Martynov, 1937a: 77. Type species - *Shurabia ovata* Martynov, 1937, by original designation.

Nivoptera Lin, 1978: 315. Type species - *Nivoptera nanshenghuensis* Lin, 1978, by original designation. **Syn. n.**

Meixiella Huang, Li & Lin, 1991: 649. Type species - *Meixiella postiretis* Huang, Li et Lin, 1991, by original designation. **Syn. n.**

REMARKS. The wing venation of *Meixiella postiretis* and *Nivoptera nanshenghuensis* very similar with other species of the genus *Shurabia*. Moreover, described in family Tomiidae *Tomia fuyuanensis* from Triassic of China must be transferred to the genus *Shurabia*. Therefore, two new generic synonyms and three new combinations are proposed here.

Shurabia postiretis (Huang, Li et Lin, 1991), comb. n.

Meixiella postiretis Huang, Li & Lin, 1991: 650, fig. 4. Holotype - imprint of fore wing; China: Jiangxi Prov., Meixi; Lower Jurassic: Menkoushan Formation; in Nanjing Inst. Geology and Palaeontology, China).

Shurabia nanshenghuensis (Lin, 1978), comb. n.

Nivoptera nanshenghuensis Lin, 1978: 316, Pl. 1, fig. 5. Holotype - imprint of fore wing; China: Guizhou Prov., Nanshenghu; Middle Triassic; in Nankig Inst. of Geology and Palaeontology, China).

***Shurabia fuyuanensis* (Lin, 1978), comb. n.**
Tomia fuyuanensis Lin, 1978: 316, Pl. 1, figs. 4, 6. Holotype - imprint of fore wing; China: Yunnan, Fuyuan, Qingyun; Triassic; in Nankig Inst. of Geology and Palaeontology, China).

35. Family Mesorthopteridae Tillyard, 1916

GENERA INCLUDED. 5 genera (*Austroidelia* Riek, 1954, *Mesoidelia* Storozhenko, 1996, *Mesorthopterina* Storozhenko, 1996, *Mesorthopteron* Tillyard, 1916 and *Parastenaropodites* Storozhenko, 1996) from Triassic of Central Asia, South Africa and Australia.

36. Family Liomopteridae Sellards, 1909

GENERA INCLUDED. 31 genera (*Abashevia* Sharov, 1961, *Analiomopterites* Storozhenko, 1992, *Cerasopterum* Kukalova, 1964, *Climaconeurites* Sharov, 1961, *Depressopterum* Kukalova, 1964, *Donopterum* Kukalova, 1964, *Drahania* Kukalova 1964, *Fumopterum* Kukalova, 1964, *Kaltanella* Sharov, 1961, *Kaltanympha* Sharov, 1961, *Karaungiroptera* Storozhenko, 1991, *Kazanella* Martynov, 1930, *Khosara* Martynov, 1937, *Lioma* Kukalova, 1964, *Liomopterella* Sharov, 1961, *Liomopterites* Sharov, 1961, *Liomopterum* Sellards, 1909, *Micropermula* Storozhenko, 1992, *Mioloptera* Riek, 1973, *Mioloptoides* Riek, 1976, *Mongolopermula* Storozhenko, 1992, *Ornaticosta* Sharov, 1961, *Ornaticostella* Storozhenko, 1992, *Paraliomopterum* Sharov, 1961, *Parapermula* Sharov, 1961, *Sarbalopterum* Sharov, 1961, *Semopterum* Carpenter, 1950, *Sibirella* Sharov, 1961, *Tapopterum* Carpenter, 1950, *Turbopterum* Kukalova, 1964 and *Tyrannopterum* Kukalova, 1964) from Permian of Europe, Asia, North America and South Africa.

37. Family Skaliciidae Kukalova, 1964

GENERA INCLUDED. Two genera (*Skalicia* Kukalova, 1964 и *Doubravia* Kukalova, 1964) from Lower Permian of Europe.

38. Family Havlatiidae Kukalova, 1964

GENERA INCLUDED. Three genera (*Havlatia* Kukalova, 1964, *Zephyropterum* Kukalova, 1964 and *Ventopterum* Kukalova, 1964) from Lower Permian of Europe.

39. Family Neleidae Ansorge, 1996

GENERA INCLUDED. One Jurassic genus (*Nele* Ansorge, 1996) from Germany.

40. Family Madygenophlebiidae Storozhenko, 1992

GENERA INCLUDED. Two genera (*Madygenophlebia* Storozhenko, 1992 and *Micromadygenophlebia* Storozhenko, 1992) from Triassic of Central Asia.

41. Family Gorochoviidae Storozhenko, 1994

GENERA INCLUDED. Three genera (*Gorochovia* Storozhenko, 1994, *Gorochoviella* Storozhenko, 1994 and *Pseudoliomopterites* Storozhenko, 1994) from Triassic of Central Asia.

42. Family Permotermopsidae Martynov, 1937, stat. resurr.

REMARKS. Family Permotermopsidae was described in Isoptera based on incomplete fore wings (Martynov, 1937b). Later it was incorrectly synonymized with family Ideliidae (Sharov, 1962; Storozhenko, 1992). Permotermopsidae has an intermediate position between Ideliidae and Megakhosaridae in the shape of costal area and in venation of the area between *CuA* and *CuP* (Fig. 13). Therefore it is regarded here as distinct family.

GENERA INCLUDED. Three genera (*Idelina* Storozhenko, 1992, *Khosaridelia* Storozhenko, 1992 and *Permotermopsis* Martynov, 1937) from Upper Permian of Russia.

43. Family Megakhosaridae Sharov, 1961

GENERA INCLUDED. 11 genera (*Ideliopsis* Carpenter, 1948, *Liomopterina* Riek, 1973, *Megakhosara* Martynov, 1937, *Megakhosarella* Sharov, 1961, *Megakhosarina* Storozhenko, 1993, *Megakhosarodes* Storozhenko, 1993, *Metakhosara* Storozhenko, 1993, *Microkhosara* Storozhenko, 1993, *Miolopterina* Riek, 1976, *Parakhosara* Storozhenko, 1993 and *Sylvakhosara* Storozhenko, 1993) from Permian of Europe, Asia, North America and South Africa and Triassic of Central Asia.

44. Family Blattogryllidae Rasnitsyn, 1976

GENERA INCLUDED. 13 genera (*Anablattogryllus* Storozhenko, 1990, *Baharellinus* Storozhenko, 1992, *Baharellus* Storozhenko, 1988, *Blattogryllus* Rasnitsyn, 1976, *Blattogryllulus* Storozhenko, 1988, *Costatooviblatta* Storozhenko, 1992, *Dorniella* Bode, 1953, *Griphopteron* Handlirsch, 1939, *Megablattogryllus* Storozhenko, 1990, *Mesoblattogryllus* Storozhenko, 1990, *Microblattogryllus* Storozhenko, 1990, *Parablattogryllus* Storozhenko, 1988 and *Protoblattogryllus* Storozhenko, 1990) from Upper Permian and Triassic of Central Asia, Jurassic of Europe, Central Asia and Mongolia and Lower Cretaceous of Siberia.

45. Family Grylloblattidae Walker, 1914

GENERA INCLUDED. Four recent genera (*Grylloblatta* Walker, 1914, *Galloisiana* Caudell, 1924, *Grylloblattina* Bey-Bienko, 1951 and *Grylloblattella* Storozhenko, 1988) from Noth America and Asia.

GRYLLOBLATTIDA INCERTAE SEDIS

There are 11 genera described on the incomplete fore wing, hind wing, or nymphal wings. These genera are placed here into the grylloblattids of uncertain positions: *Haplopterum* Martynov, 1928, *Khosarophlebia* Martynov,

1940, *Termoides* G.Zalessky, 1955, *Uralotermes* G. Zalessky, 1937 from Lower Permian of Russia, *Sunopterites* Hong, 1983 from Lower Permian of China, *Kaltanopterodes* Sharov, 1961, *Kargarella* Martynov, 1937 (=*Kargalodes* Martynov, 1937), *Mitinovia* Sharov, 1961 from Upper Permian of Russia,*Liomoptoides* Riek, 1973, *Neoliomopterum* Riek, 1976 from Upper Permian of South Africa and *Lemmatophoropsis* G.Zalessky, 1935 from Lower Triassic of Russia.

TAXA ERRONEOUSLY INCLUDED IN GRYLLOBLATTIDA

1. Family Permoneuridae (with *Permoneura lameerei* Carpenter, 1976 from Lower Permian of U.S.A.) was considered to be grylloblattids (Rasnitsyn, 1980a). But this family has no any grylloblattid characters and placed here in Insecta incertae sedis.

2. Two genera from Lower Permian of Chekarda, *Aetophlebiopsis* G.Zalessky, 1955 (with *A. fusca* G.Zalessky, 1955) and *Sellardsiopsis* G. Zalessky, 1939 (with *S. conspicua* G.Zalessky, 1939), are placed here in Insecta incertae sedis.

3. Family Chresmodidae (with *Chresmoda obscura* Germar, 1886 from Jurassic of Germany) transferred to grylloblattids by A.G.Ponomarenko (1985). The shape of body and venation of wings have not any grylloblattid features, therefore Chresmodidae is placed here in the insects of uncertain position.

4. Described as grylloblattids genus *Hsuopterites* Hong, 1983 (with *H. rotundatus* Hong, 1983 from Upper Carboniferous of China) (Hong, 1983) must be removed to Blattoptera incertae sedis.

5. Genus *Sharovia* Pinto et Ornellas, 1978 (with *Sh. permiafricana* Pinto et Ornellas, 1978 from Permian of South America) originally described in Liomopteridae. The correct identification of imprint of the damaged wing is impossible. This genus is placed in Insecta incertae sedis here. Moreover, the name *Sharovia* preoccupied by N.Sinichenkova (1977) in Plecoptera.

6. I studied additional material of *Sarbalopterodes frivolus* Storozhenko, 1991 from Upper Permian of Kazakhstan and found that *Sarbalopterodes* Storozhenko, 1991 must be transferred from Grylloblattida to order Miomoptera.

7. Genus *Sinogramma* Hong, 1976 described from Upper Jurassic of China in the order Caloneurodea (Hong, 1976). Later it was placed in new family Sinogrammitidae (sic!) of the order Paraplecoptera (Hong, 1982). The description is based on fragment of fore wing of cockroaches and therefore *Sinogramma* is removed here to Blattoptera incertae sedis.

8. Genus *Longipedia* Hong, 1984 (with *L. pinquanensis* Hong, 1984 from Upper Jurassic of China) was described in Paraplecoptera (Hong, 1984). According to the photo of holotype the reconstruction of wing venation of this insect is incorrect, the legs probably belongs to another specimen and what is why *Longipedia* is placed here in insects of uncertain position.

9. Genus *Fabreciella* Carpenter, 1934 (with *F. allegneniensis* Carpenter, 1934 from Upper carboniferous of U.S.A.) has no any grylloblattid characters and removed here to Insecta incertae sedis.

10. Based on venation of fore wing genus *Narkema* Handlirsch, 1911 and family Narkemidae were placed in Insecta incertae sedis (Storozhenko, 1996).

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